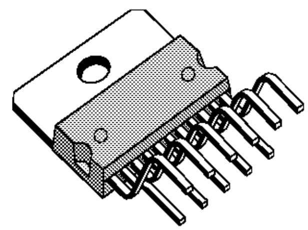
SGS-THOMSON MICROELECTRONICS

TEA5101A

RGB HIGH VOLTAGE VIDEO AMPLIFIER

- BANDWIDTH : 10MHz TYPICAL
- RISE AND FALL TIME : 50ns TYPICAL
- CRT CATHODES CURRENT OUTPUTS FOR PARALLEL OR SEQUENTIAL CUT-OFF OR DRIVE ADJUSTMENT
- FLASHOVER PROTECTION
- POWER DISSIPATION : 3.5W
- ESD PROTECTED



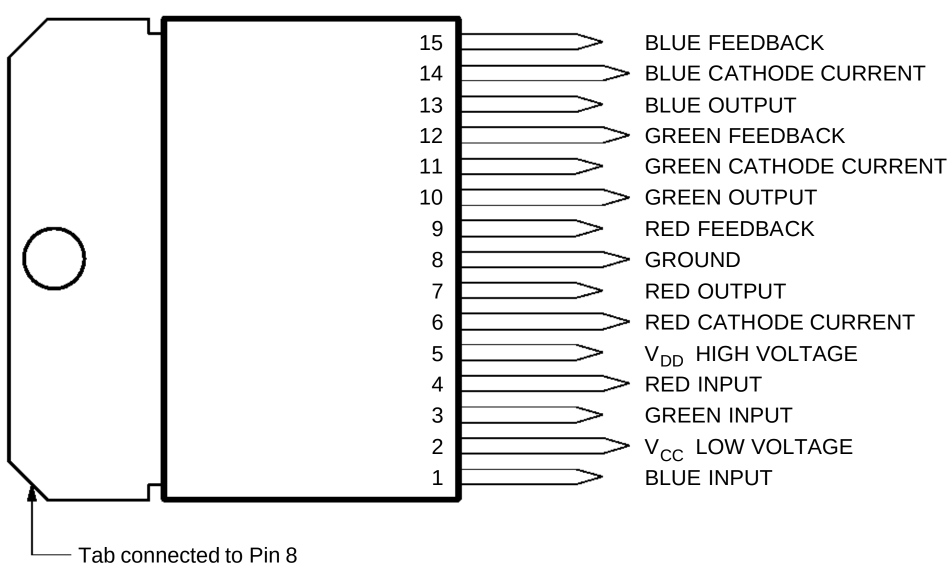
MULTIWATT 15
(Plastic Package)

ORDER CODE : TEA5101A

DESCRIPTION

The TEA5101A includes three video amplifiers desi-gned with a high voltage DMOS/bipolar technology. It drives directly the three CRT cathodes. The device is protected against flashovers. Due to its three cathode current outputs, the TEA5101A can be used with both parallel and sequential sampling applications.

PIN CONNECTIONS (top view)

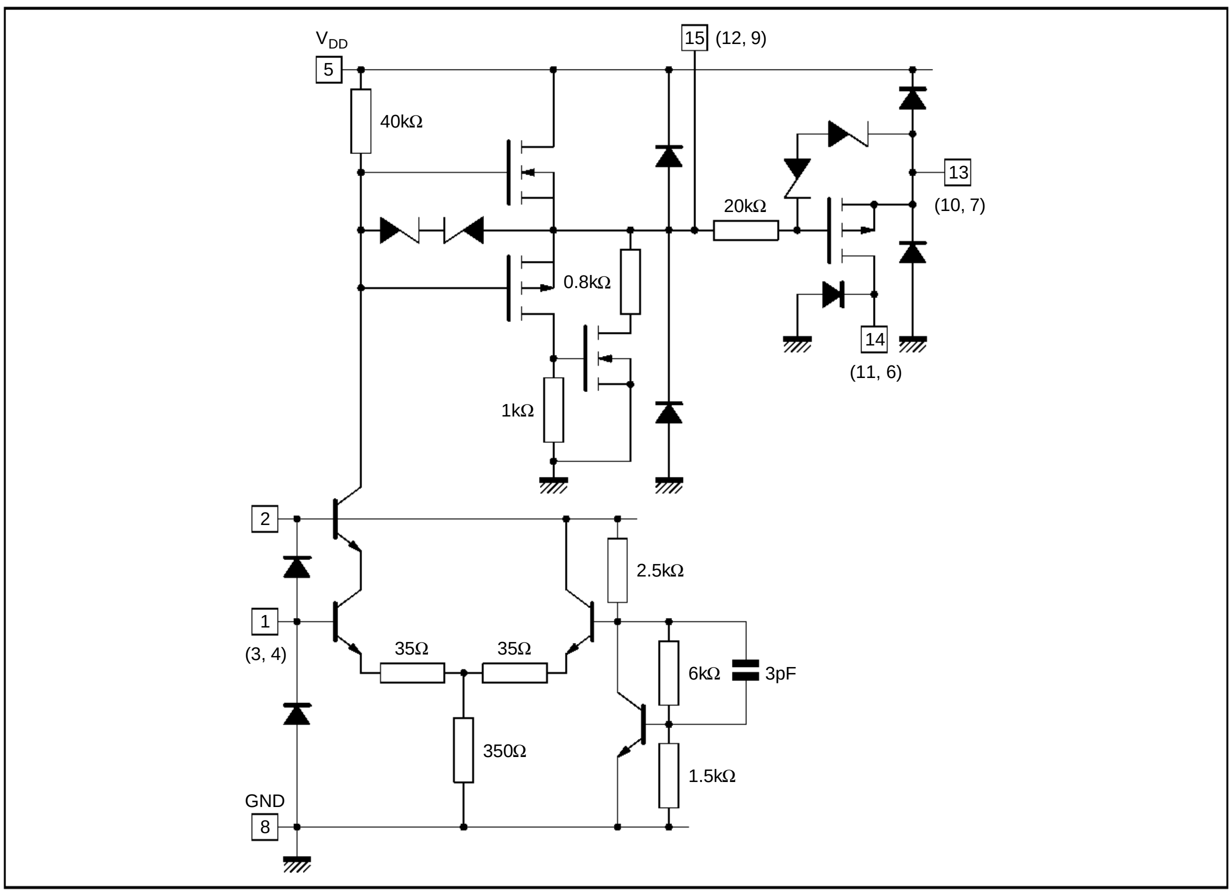


PIN FUNCTION

N°	Function	Description
1	Blue Input	Input of the "blue" amplifier. It is a virtual ground with 3.8V bias voltage, 15 microamperes input bias current with 14kΩ input resistance.
2	V_{CC}	Low voltage power supply, typically 12V.
3	Green Input	See Pin 1.
4	Red Input	See Pin 1.
5	V_{DD}	High voltage power supply, typically 200V.
6	Red Cathode Current	Provides the video processor with a copy of the DC current flowing into the red cathode, for automatic cut-off or gain adjustment. If this control is not used, Pin 6 must be grounded.
7	Red Output	Output driving the red cathode. Pin 7 is internally protected against CRT arc discharges by a diode limiting the output voltage to V_{DD}.
8	Ground	Also connected to the heat sink.
9	Red Feedback	Output driving the feedback resistor network for the red amplifier.
10	Green Output	See Pin 7.
11	Green Cathode Current	See Pin 6.
12	Green Feedback	See Pin 9.
13	Blue Output	See Pin 7.
14	Blue Cathode Current	See Pin 6.
15	Blue Feedback	See Pin 9.

5101A-01.TBL

BLOCK DIAGRAM OF EACH CHANNEL



5101A-02.EPS

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter		Value	Unit
V_{DD}	Supply High Voltage	Pin 5	250	V
V_{CC}	Supply Low Voltage	Pin 2	35	V
 I_O I_O	Output Current to V_{DD} to Ground	Pins 7 - 10 - 13	 Protected 8	 mA
 I_F I_F	Output Current to V_{DD} to Ground	Pins 9 - 12 - 15	 45 45	 mA mA
I_j	Input Current	Pins 1 - 3 - 4	60	mA
T_j	Junction Temperature		150	°C
T_{oper}	Operating Ambient Temperature		0 to 70	°C
T_{stg}	Storage Temperature		– 55 to + 150	°C

5101A-02.TBL

THERMAL DATA

Symbol	Parameter		Value	Unit
R_{th}(j-c)	Maximum Junction Case Thermal Resistance	Max.	3	°C/W
R_{th}(j-a)	Typical Junction Ambient Thermal Resistance	Typ.	35	°C/W

5101A-03.TBL

ELECTRICAL CHARACTERISTICS

T_{amb} = 25°C ; V_{CC} = 12V ; V_{DD} = 200V ; AV = 50 (unless otherwise specified)

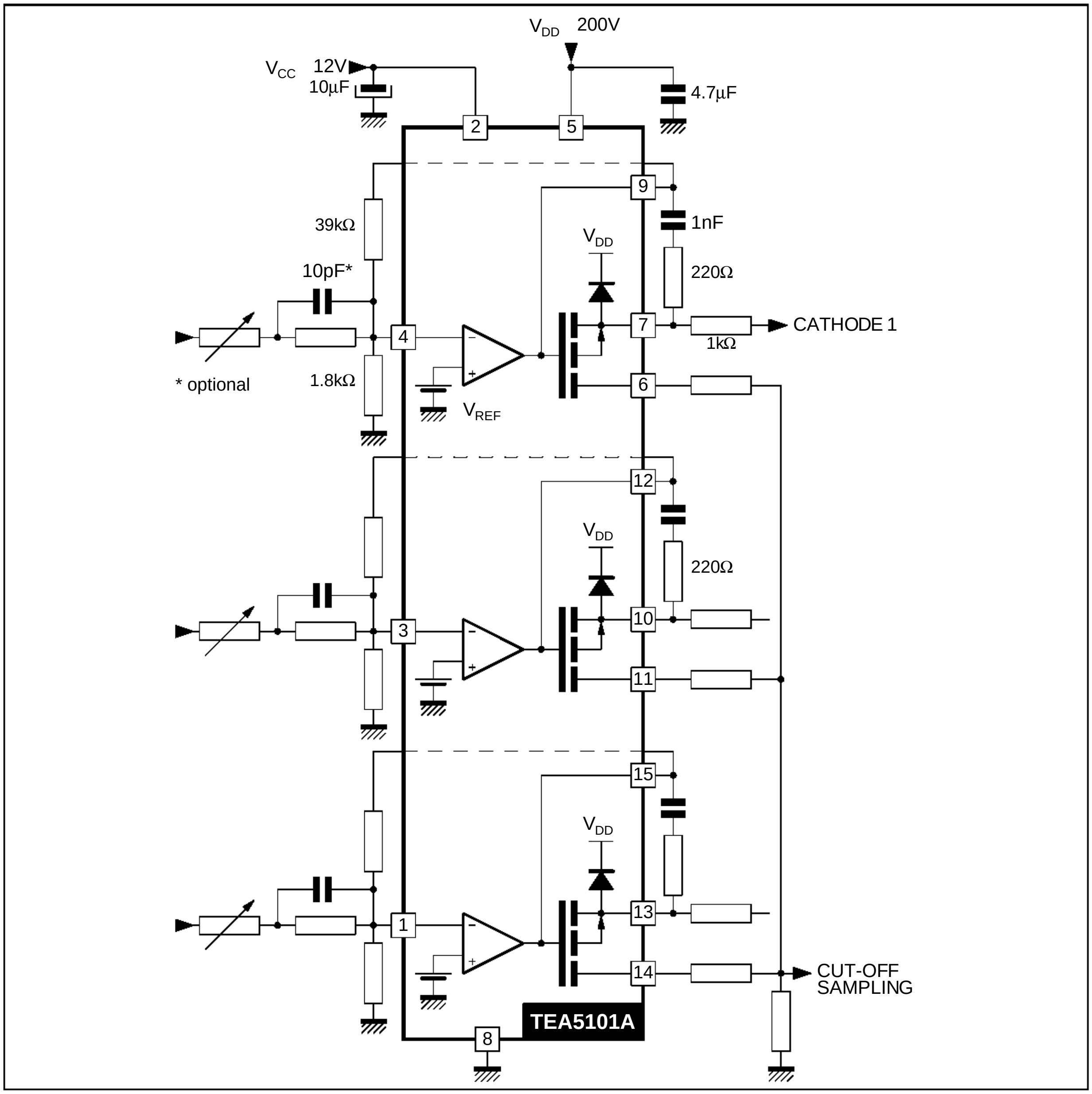
Symbol	Parameter		Min.	Typ.	Max.	Unit
V_{DD}	High Supply Voltage	Pin 5		200	220	V
V_{CC}	Low Supply Voltage	Pin 2	10	12	15	V
I_{DD}	High Voltage Supply Internal DC Current (V_{out} 100V) (without the current due to the feedback network)	Pin 5		8	12	mA
I_{CC}	Low Voltage Supply DC Current	Pin 2	19	33	47	mA
V_{sath}	Output Saturation Voltage (High level) I_O = – 10 µA	Pins 7-10-13		3	10	V
R_{ON}	Output Mos Transistor (Low level) R_{ON} @ I_O = 3 mA	Pins 7-10-13		1.7		kΩ
BW	Bandwidth (– 3db) (measured on CRT cathodes) (C_{LOAD} : 10pF – R Protect = 1kΩ – V_{out} = 100V) Δ V_{out} : 50 V_{PP} Δ V_{out} : 100 V_{PP}			 10 8		 MHz MHz
T_R - T_F	Rise Time and Fall Time : measured between 10% and 90% of output pulse (C_{LOAD} : 10 pF – R Protect = 1 kΩ – V_{out} = 100 V) Δ V_{out} : 100 V_{PP}			50		ns
G_O	Open Loop Gain		47	50		dB
P	Internal Power Dissipation (see calculation below)			3.5		W
V_{REF}	Internal Voltage Reference	Pins 1-3-4	3.55	3.8	4.05	V
	Internal Reference Voltage Difference Between 2 Channels				5	%
	Voltage Reference Temperature Coefficient			– 5		mV/°C
I_{IB}	Input Bias Current (V_{out} : 100 V)	Pins 1-3-4		15		µA
R_I	Input Resistance			14		kΩ

5101A-04.TBL

TYPICAL APPLICATION

The TEA5101A consists of three independent amplifiers. Each of them includes :

- A differential amplifier, the gain of which is fixed by external feedback resistors,
- A voltage reference,
- A PMOS transistor providing a copy of the cathode current,
- A protection diode against CRT arc discharges.



5101A-03.EPS

APPLICATION INFORMATION

PC BOARD LAYOUT

The best performances of the high voltage video amplifier will be obtained only with a carefully designed PC board. Output to input capacitances are of particular importance.

For a single amplifier, the input-output capacitance, in parallel with the relatively high feedback resis-tance, creates a pole in the closed-loop transfer function. A low parasitic capacitance (0.3pF) feedback resistor and HF isolated printed wires are necessary. Further more, capacitive coupling from the output of an amplifier toward the input of another one may induce excessive crosstalk.

POWER DISSIPATION

The power dissipation consists of a static part and a dynamic part. The static dissipation varies with the output voltage. With V_{DD} = 200V, P_{stat} = 2.6W typ(3.5W max) at V_{OUT} = 100V, 1.5W typ at 150V and 3W typ at 50V (with R feedback = 39kΩ). V_{OUT} first value (100V) will be the reference.

The dynamic dissipation depends on the signal spectrum and the load capacitance.

- Dynamic power with a typical picture with 150 V_{pp} modulation is typically 1W.
- For a sine wave, dynamic dissipation per amplifier is $P_d = F \times C_l \times V_{opp} \times V_{dd} \times 0.8$.

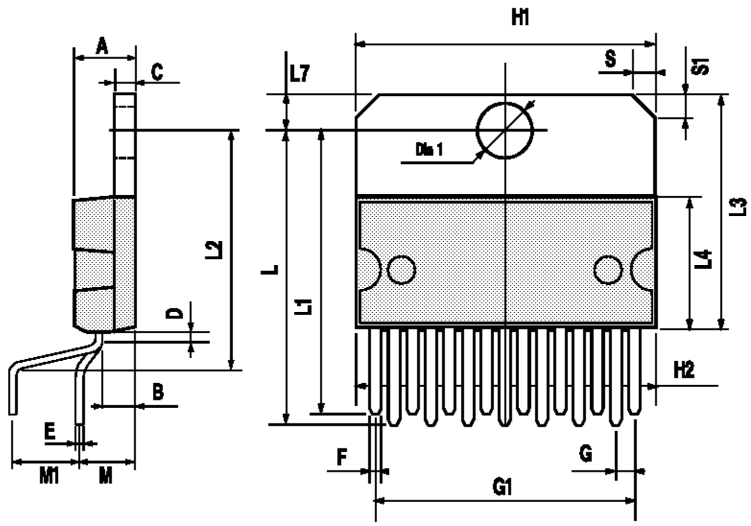
The load capacitance C_L includes CRT and board capacitance (10pF), and amplifier output capacitance (8pF) : total C_L value is about 20pF. For a 5MHZ, 50 V_{pp} sine wave and a 20pF load capacitance, the maximum dynamic power is 2.5W.

- Generally, the maximum dynamic power is reached with a white noise (tuner noise).
- Typical value is about 2W.

Total dissipation is typically 3.6W (2.6W + 1W). With a maximum static dissipation of 3.5W, total dissipation is :

- 4.5W with a typical picture (UER pattern)
- 5.5W with white noise

PACKAGE MECHANICAL DATA : 15 PINS – PLASTIC MULTIWATT



PMMUL15V.EPS

Dimensions	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			5			0.197
B			2.65			0.104
C			1.6			0.063
D		1			0.039	
E	0.49		0.55	0.019		0.022
F	0.66		0.75	0.026		0.030
G	1.14	1.27	1.4	0.045	0.050	0.055
G1	17.57	17.78	17.91	0.692	0.700	0.705
H1	19.6			0.772		
H2			20.2			0.795
L	22.1		22.6	0.870		0.890
L1	22		22.5	0.866		0.886
L2	17.65		18.1	0.695		0.713
L3	17.25	17.5	17.75	0.679	0.689	0.699
L4	10.3	10.7	10.9	0.406	0.421	0.429
L7	2.65		2.9	0.104		0.114
M	4.2	4.3	4.6	0.165	0.169	0.181
M1	4.5	5.08	5.3	0.177	0.200	0.209
S	1.9		2.6	0.075		0.102
S1	1.9		2.6	0.075		0.102
Dia. 1	3.65		3.85	0.144		0.152

MUL15V.TBL

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